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The Health Papers

Managing Medicare

The Prerequisite to Spending or Reform

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In this issue...

Managers of Canada's publicly funded health care systems pay inadequate attention to the benefits and costs of treatment and funding decisions. An administrative framework of program budgeting and marginal analysis would provide more bang for the health care buck, and should be an integral part of future changes in the funding and management of Canadian health care.

The Study in Brief

Talk of crisis and calls for more funds obscure the fact that scarcity is a normal condition in publicly funded health care. Resources devoted to one service provided by a hospital or doctor are of necessity not available for other services. With or without other changes in the funding and organization of medicare in Canada, achieving a more advantageous balance of benefits delivered versus resources consumed will be a continuing necessity.

Recent reports from provincial auditors general and surveys of the management of regional health authorities reveal a lack of formal processes for setting priorities and allocating resources, with history being the most important driver of allocations, and little consideration to issues of transparency and explicitness. A better approach would be to use program budgeting and marginal analysis (PBMA), which would provide a consistent framework with which to compare the costs and benefits of health administrators' choices. Their task is to move consistently toward relatively higher benefits and relatively lower costs, incorporating the best available knowledge about the links between treatments and health outcomes.

Using PBMA involves answering five key questions: What level of resources do we have? How are these resources currently spent? What would we like to do more of, and what would be the impact in terms of extra resources required and benefits to patients or the population? Can we be more technically efficient? If we cannot be more technically efficient, are there any areas of care that, despite being effective, should receive fewer resources because something else we have identified is more effective per dollar spent?

Even when there are information gaps, PBMA provides a framework for explicitly balancing marginal benefits against marginal costs that is flexible in the criteria it can include and yet allows decisionmakers to act in a timely manner. Implementing such management techniques would be a key step in the administration of health care services in Canada, whether or not more radical reforms are in store.

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According to many health policy commentators, medicare in Canada is in crisis. Two reasons are often given for this assessment. First, Canada has fallen in the international rankings; it is no longer second to the United States in health care spending (Deber and Swann 1999), and many observers have argued that the cuts to publicly funded spending on health care in the mid- to late 1990s were too large. Second, it is often claimed that health care in Canada is no longer sustainable structurally, due to the pressures of an aging population and the costs of technological advancement (Dirnfield 1996; Fraser Institute 1998). Although practical reforms to these pressures have been offered elsewhere (see, for example, Robson 2001), many commentators use these arguments to justify major overhauls of medicare involving substantial structural reform or more private financing (through the use of private insurance or user charges). Others, most notably the Provincial and Territorial Ministers of Health (2000), simply call for more public spending on the system.[1]

The real problem, however, is scarcity of resources. The "crises" noted above simply highlight the fact that such scarcity is a perpetual problem in health care. In this *Commentary*, we propose a first step toward solving the resource allocation challenge caused by this inevitable scarcity.

This first step is not very exciting. It does not involve private financing, structural reforms, or increased spending. Rather, it depends on improving the management of resources in the system by implementing some basic economic principles. Whatever reforms are implemented in the foreseeable future, the system will likely be similar in structure to the current one. Thus, no matter what else occurs in health care, better management is a critical step.

Regional health authorities have been established in most provinces over the past seven years. This was a major reform. It could be argued that, having survived periods of budget cutting, these authorities are now well placed to take a more mature approach to health care planning and should be given the chance to do so. In other words, before simply spending more resources on health care or proceeding with further reform, perhaps managers, clinicians, and politicians should consider improving resource management within the current system. This paper provides a framework for doing so.[2]

Outline of the Commentary

We begin our argument by questioning the two common assumptions about medicare mentioned above. We suggest that neither Canada's aging population nor the rapid pace of technological change necessarily threatens medicare's sustainability, and we provide reasons why health care spending need not

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1 According to data from Health Canada, from 1993 to 1997 (or thereabouts) there was a real decline in spending of 0.6 percent annually, principally in the public sector. However, cost escalation took off again in fiscal year 1999/2000 — typically 5 to 7 percent, and more elsewhere. Forecasts for 2000/01 are for another rise of 5 percent.

2 In the first of our two contributions to this series, we discussed possibilities for reform in Canada that have been implemented in other countries. See Donaldson, Currie, and Mitton (2001).

necessarily be increased. We then introduce some first principles of economics that may be useful in setting priorities for health care policy.

In the next section of the paper, we review how health policy priority setting currently takes place in Canada, with reference to reports of several provincial auditors general and to some recent empirical evidence from Alberta. We conclude that there is a serious need for a rational, practical, process-based approach to making health care priority decisions.

We then look at some past approaches to making these decisions, noting in particular how most fall short of meeting important economic principles. Finally, we present a framework, known as program budgeting and marginal analysis (PBMA), that does comply with these principles and that, international experience suggests, could help Canadian regional health authorities reach their ultimate objective — meeting the most needs possible with available resources.

We do not discuss the application of this framework in detail; our key objective is to present and expand on the economic principles that underlie it, and how regional decisionmakers could use it. Since the actual use of the framework will be different in each context, a "cookbook" approach would be unhelpful. Several references are provided, however, for the reader interested in pursuing the practical aspects of such a framework.

Is Medicare Really Doomed?

It is often accepted without question that aging populations and technological advances will place an unbearable burden on publicly funded health care systems, threatening their sustainability. Indeed, the recent report by the Provincial and Territorial Ministers of Health (2000) calls for a vast increase in public funding of health care, justified primarily by these two key factors. However, alternative schools of thought challenge the claim that the fall of medicare is imminent without more cash. Certainly, changing demographics and technology do present challenges to any health care system, but we object to the notion — perpetuated by those who use the "facts" about Canada's aging population and technological change to advocate particular courses of action — that Canadian health care is necessarily in a state of crisis and impending doom.

The challenges attributable to an aging society and evermore complex medical technology do not necessarily justify the great influx of cash advocated by the provinces.

The challenges attributable to an aging society and evermore complex medical technology do not necessarily justify the great influx of cash advocated by the provinces. Some new technology can actually save resources — witness the recent development of pancreatic cell transplants by University of Alberta researchers, which may free some diabetics from dependence on insulin. Further, empirical evidence on our aging population gathered during the 1960–88 period suggests that this demographic shift does not actually have a significant impact on health care costs, once other factors are accounted for (Getzen 1992). What the provinces, and their electorates, have failed to recognize in their calls for more resources is that not every new technological advancement must be provided and that society has the option of choosing less intensive paths of care for the elderly. Yet politicians and voters seem unwilling to accept the fact that choices must be made.

We do not claim that an aging population and technological change have no impact on Canada's health system. The challenges these developments present are

real and significant. We believe, however, that these are not forces that doom the sustainability of the health care system but are simply issues that highlight the challenge we already face: finding the optimum way to allocate health care resources in the face of competing claims.

Is Increased Public Financing the Answer?

Proposals simply to spend more tax dollars on the system should not, in our opinion, be the primary policy response.

There are several ways of dealing with any increased burden placed on medicare in the future. In terms of publicly financed health care, many of these alternatives have been outlined by Ham (1993). The proposal by the Provincial and Territorial Ministers of Health (2000) and some media (see, for example, Angus et al. 1995) simply to spend more tax dollars on the system should not, in our opinion, be the primary policy response, for three reasons.

Scarcity Is Here to Stay

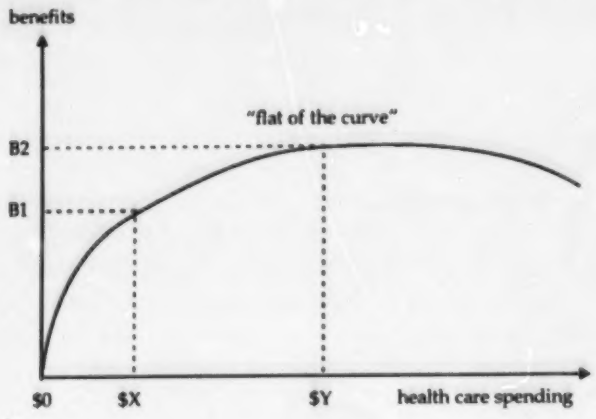
The first reason for not necessarily spending more is that scarcity is a fact of life. No matter the size of the health care budget, it will always be a fixed envelope of funds. The claims will always be greater than the resources available, in that there will always be more ways to spend those resources (see Fordyce, Mooney, and Russell 1981; Donaldson and Farrar 1993; McKneally et al. 1997). Thus, while demanding more resources for the health system overall is an attractive option politically, in reality better management of the currently available resources is required. Good management starts with trading off low-priority items for high-priority ones (Wordsworth, Donaldson, and Scott 1996).

There Are Other Ways to Improve Health

Second, the overall objective of improving health may be better reached in other ways. Medical spending is not the only "input" into the "production" of better health. Housing, education, diet, lifestyle, and the environment all influence health (Evans, Barer, and Marmor 1994). Given that there may be other ways in which health can be improved, the main question then becomes whether spending more public money on housing or education, for example, could lead to greater improvements in health than investing the same amount of additional money on medicare. McKeown (1979), for example, argues that past reductions in mortality in developed countries owed more to environmental factors (such as better hygiene and sanitation) than to improved medical care. In more recent times, alcohol, smoking, and poor diet have been implicated as causal factors in many diseases. The association between deprivation and ill-health is well documented in the literature. Furthermore, as Corman and Grossman (1985) find, although better access to health care has a positive effect on health, so too do higher income and more schooling.

These issues lead to questions about the productivity of health care compared with other "inputs" that affect health. There are no recent estimates of how various factors compare, but Auster (1972) found that increased spending on education had more potential for reducing mortality than did increasing per capita health spending.

Figure 1: ***The Effects of Increased Medicare Spending***



As Spending Rises, Return on the Dollar Diminishes

The third reason just spending more on health care may not be the answer relates to the fact that, within the health care system itself, it is possible to define claims on resources not in terms of needs or wants but as services that do or do not produce a positive health outcome (Birch and Chambers 1993). On the face of it, this approach seems attractive, especially since many health care activities appear to be carried out inefficiently. Unfortunately, we simply do not have enough valid and reliable tools with which to determine, for the broad range of possible services, which ones provide a positive health outcome and which do not (Jones and Wright 1997).

Figure 1 shows a (hypothetical) relationship between benefits (that is, health outcomes) and health care spending, holding all other determinants of health constant. The level of health spending on the horizontal axis could be interpreted as total national spending, total regional health authority spending, spending related to a particular treatment, or spending on a particular patient. In all these cases, whether or not we should spend more depends on the *additional* health benefits that would result, compared with the *additional* health benefits that would be gained by spending the same amount on another determinant of health, such as education. For example, it may be that, at levels of health care expenditure between zero and $X, the extra benefits that would result from increased spending are greater than the extra benefits to be gained from using those resources elsewhere. At those levels, we should spend more on health care.

There will come a point where the benefits achieved by greater health care spending are less than the benefits of diverting that spending elsewhere.

There will come a point, however, where the benefits achieved by greater health care spending are less than the benefits of diverting that spending elsewhere. In the diagram, this situation is reached at the point where $X is spent. At this level of spending or higher, more well-being might be generated by putting resources into other sectors of the economy (or other health care treatments). If so, $X should be the maximum we spend on health care. If we increase spending beyond this point — for example, up to $Y — we are forgoing more benefits than we actually produce, and society is worse off. At $Y, with benefits of B2, we are on the "flat of the curve," the point where maximum benefits are being generated. Any extra spending is unproductive in terms of health gains. If we continue to spend more and more, benefits eventually will decline, perhaps indicating that patients are being harmed. The problem is that, without adequate tools to measure outcomes, we are unsure where on this curve we lie.

There is much evidence that inappropriate "flat-of-the-curve" spending takes place in the United States for some procedures. For example, panels of experts estimate that between 13 and 32 percent of surgeries for carotid endarterectomy are undertaken inappropriately (Merrick et al. 1986; Chessin et al. 1987; Winslow et al. 1988a). Inappropriate surgeries also occur in 14 percent of coronary artery bypass cases (Winslow et al. 1988b) and in as many as 86 percent of tonsillectomy cases

(Roos, Roos, and Henteleff 1977). In Canada, variations both within and between provinces are observed for a number of kinds of surgery (Gentleman et al. 1996; Hall and Cohen 1994; Hartford, Roos, and Walld 1998). It is also well known that obstetricians' individual practice style is a determinant of cesarean-section birth rates, while no obvious difference in neonatal outcomes is associated with differences in the rate. Governments and the public may be forgiven for wondering if such variations in practice reflect poor management of the health care system and, accordingly, why they should invest more in it.

Thus, more spending is not a panacea. Rather, the efficiency of the health care system within the constraint of limited resources could be improved by focusing on setting priorities based on measured outcome. This efficiency goal will be reached when the benefits gained are maximized and the opportunity costs (that is, the benefits lost) are minimized. The next two sections of the paper focus on several approaches that might aid in this process.

Dealing with Scarcity: Some Principles of Economics

Although an aging population and advances in medical technology may not lead to the health care crisis that many expect, some pressure on the system is likely to arise from those factors. In our view, however, this likelihood highlights the existing need for a more informed approach to the allocation of current and future health care resources. History tells us that the total amount a society spends on health care is likely to increase incrementally at best. If we want to get the best out of what really amounts to a limited budget, certain economic principles should be adhered to more closely. Taking a more proactive view of the management of resources also makes good sense in times of surplus; discussion of resource allocation does not necessarily have to focus only on doing more with less.

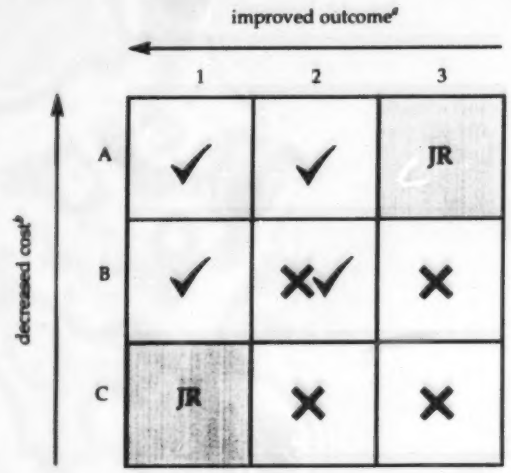
If we want to get the best out of what really amounts to a limited budget, certain economic principles should be adhered to more closely.

Opportunity Costs

Economics and priority setting go hand in hand. Both are based on the undeniable fact that resources are scarce. Given this scarcity, choices must be made about what health services and how much of them to purchase (or provide, depending on how one looks at it). Notwithstanding worthy statements about the right of access to care and the necessity of meeting needs, some needs will be met while others will not — at least, not immediately (Donaldson 1996).

How, then, do we decide which needs to meet? The basis of the economic approach to this question is the principle of *opportunity cost*. In the context of choice under scarcity, meeting one need means forgoing the opportunity to meet another. Opportunity costs are the lost benefits associated with forgone opportunities. In order to maximize benefits to the community and minimize opportunity costs, one must measure the costs and benefits of health care services. "Costs" here reflect resources used, since all resources are associated with opportunity costs; "benefits" represent gains in health and well-being brought about by the use of these resources. By measuring both, one can choose that combination of resources which maximizes benefits (and, consequently, the extent to which needs are met) from available resources.

Figure 2: *A Matrix Linking Effectiveness with Cost*



✓ = yes; ✗ = no; ✓✗ = indifferent; JR = judgment required.

[a] Compared with the control treatment, the experimental treatment has

1. evidence of greater outcome
2. evidence of no difference in outcome
3. evidence of less outcome.

[b] Compared with the control treatment, the experimental treatment has

A. evidence of cost savings
B. evidence of no difference in costs
C. evidence of greater costs.

Source: Adapted from Sackett and Oxman, eds. 1995.

A Decisionmaking Matrix

How can information on costs and health gains be used to help make decisions? We propose a simple framework. Since all regional health authorities and hospitals face a certain mix of resources use, any change in the way care is delivered will have an impact both on health outcomes and on costs. By deriving and linking estimates of the relative costs and outcomes of alternative approaches under consideration, it should be possible to determine whether a change results in:

- lower costs and an outcome that is the same as or better than current care, in which case the new procedure would be unequivocally judged to be a better use of health care resources (that is, more technically efficient); or
- higher costs and a better outcome than current care, in which case a judgment would have to be made about whether the extra cost is worth the gains in health — this is a question of allocative efficiency, since treating the same number of patients by this option will mean allocating more resources to this group and less to another group of patients.

Data on outcomes and costs can be summarized in a matrix format (see Figure 2) to aid in the judgment of whether a new policy is preferable to the current situation. As the matrix shows, relative to the status quo, a change in health care delivery could achieve (1) a better outcome, (2) a similar level of outcome, or (3) a less satisfactory outcome. In terms of cost, a change could (A) save costs, (B) result in no difference in costs, or (C) increase costs.

The optimum position on the matrix is square A1, where a given change would both save costs and have better health outcomes relative to current care. In squares A1, A2, and B1, the change leads to more efficient care; these positions are therefore assigned a checkmark in response to the question of whether the change is to be preferred to current care. In squares B3, C2, and C3, the change is less efficient than current care and thus receives an "x" response. Squares A3 and C1 are labeled "JR" because, for changes in these categories, a judgment would be needed as to whether extra health benefits justify the extra costs (C1) or the cost savings justify the lost benefits (A3). In square C1, for example, there is an opportunity cost involved, as the resources required to implement the change would have to be diverted from some other part of the health care system. In both cases, economics cannot make the decision, but it can highlight the magnitude of the extra resources that would be required and the improvement in outcome that would be gained if

the change were made. Square B2 is neutral — there is no difference in either costs or effectiveness.

The framework we propose later in the *Commentary* is based on implementing this straightforward decision matrix.

Marginal Analysis

The tasks of measuring costs and benefits and then using the decision matrix are not as daunting as they may seem. The first principle is to focus on marginal analysis. This approach involves starting with a particular mix of services and analyzing the results of making small changes to that mix, rather than attempting to start from scratch. If the mix can be changed to produce greater benefit, this should be done; we are not advocating zero-based budgeting. Marginal analysis does not always involve deciding whether to introduce or eliminate a service in totality, as in the "core services" approach discussed later in the paper; rather, it involves having more of one service or less of another.[3]

Marginal analysis is a key tool for making the most of available resources by deploying them either across or within health care programs so that potential benefits are maximized.

Marginal analysis is a key tool for making the most of available resources by deploying them either across or within health care programs so that potential benefits are maximized. This goal is achieved when no reallocation of resources from one service to another will result in an increase in total benefits (Mooney, Russell, and Weir 1986). Strictly speaking, marginal analysis is concerned only with the last "unit of production" of any two or more given programs; the appropriate balance or mix of services is determined by examining the relative costs and benefits of the various options at the margin. This type of analysis highlights tradeoffs, thereby helping decisionmakers to assess properly proposals for change on the basis of the opportunity costs and benefits of the given options.

A useful illustration of these principles is provided in the case of the "sixth stool guaiac." Neuhauser and Lewicki (1975) show that the average cost per case of colon cancer detected by testing each stool sample six times is about $2,450, but that the marginal cost — that is, the extra cost per case detected by testing each sample six times, which would ensure all cases are detected, instead of five — is over $47 million. The opportunity cost of having six rounds of testing rather than five is great; the resources could be better spent — that is, they could produce more benefit in terms of health gain — elsewhere. Looked at in terms of the matrix in Figure 2, six rounds of testing falls into cell C1. It produces a small amount of health gain (by detecting a few cases of cancer that would not be detected by five rounds) but at a very large extra cost; most policymakers would likely judge that the gain is not sufficient to justify the very large cost involved.

Using marginal analysis in this way does not give the "right answer." With the resources available to them, it is still up to decisionmakers to balance costs against outcomes — to judge, in the example given above, how much it is worth spending to detect another case of colon cancer. But using the economics framework likely results in better decisions than implementing policies in its absence.

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3 Of course, it is possible that total spending is not at an optimal level, in which case any mix of services reached by the method we outline essentially will be a second-best solution. No matter how many resources are available, however, examining changes at the margin enables benefit levels to be improved *for the given budget*.

The need for rationing is not new; whatever the level of available resources, it is important to bear in mind that the question here is not usually whether or not to provide a service but, rather, how much of it to provide. Furthermore, it may not always make sense to opt for the ideal service (from the patient's perspective); in the case mentioned above, for example, it is probably not worth detecting every case of cancer that we expect to be out there. If the incremental, or marginal, cost of treating another equally serious condition more intensively is lower, then equal or greater benefit might be derived from diverting resources away from the one and toward the other.

It may be that some health care decisionmakers already operate, and many more try to do so, at the margin, with due consideration of opportunity cost. We simply advocate that this type of decisionmaking should become more explicit and systematic in the realm of health care. From empirical analysis, Klein and Redmayne (1993) observe that many regional health authorities in the United Kingdom are comfortable with no explicit rationing (in the sense of complete removal of services from public funding) at all, and Ham (1993) notes that regional health authorities have "avoided excluding services entirely from their contracts." Neither of these views is too far removed from the economics perspective, which says that rationing is about having more of some services and less of others rather than introducing or eliminating whole services. In the above example of screening for colon cancer, marginal analysis does not lead to suggestions that such screening be eliminated, but only that the number of tests be stopped at five (or even fewer), not six; it is not the existence of the program that is questioned, only its size. The assertions of Klein and Redmayne are also reminiscent of Hunter's description of the UK National Health Service as "muddling through elegantly" — that is, trying to set priorities at the margin but on the basis of data that are not particularly robust, involving the public where appropriate, accepting that doctors are accountable to groups of people as well as to individual patients, and, where possible, basing decisions on health outcomes (Hunter 1993).

Health Policy Priority Setting in Canada

Closer to home, it may be that decisionmakers think they are operating according to the framework we outlined in the last section, but this may not actually be the case. A review of a number of recent reports of provincial auditors general makes clear that formal comparison of costs and benefits and consideration of opportunity costs at the margin have yet to take hold in certain jurisdictions.[4] The 1999 report in Quebec included the following statement:

Formal comparison of costs and benefits and consideration of opportunity costs at the margin have yet to take hold in certain jurisdictions.

> The managers we met universally say that the Info-Santé [health watch] service is quite relevant and deserves to be better known. However, the department has not set indicators to measure the use of the service by various types of clients as well as anticipated benefits, such as the decreasing number of visits to hospital emergency departments and private clinics. In the absence of such markers, the department and the regional boards can hardly assess to what extent this service contributes to a rational use of social and health care resources. (Quebec 2000.)

4 The authors would like to thank Bill Robson of the C.D. Howe Institute for drawing this information to our attention.

Similarly, the 1999 Nova Scotia Auditor General's report states:

> We noted the following with respect to required improvement in [Northern Regional Health Board's] internal financial management practices: Budgeting — We recommend review of programs, during the annual budget process, to determine if there is a more cost efficient way to deliver services. Such a review could help identify cost savings that could be implemented without significant impact on service levels. (Nova Scotia 1999.)

Finally, the Ontario Auditor General commented:

> There were insufficient procedures to ensure that hospitals were funded equitably. In order to ensure that funding reasonably relates to hospital services provided, the Ministry needed: to develop systems to fund hospitals based on the demand for services rather than on historical expenditure patterns. (Ontario 2000.)

These specific examples illustrate that managers in the health care system are not quite as advanced in their planning, from a health economics perspective, as they could be.

In most of Canada, responsibility for setting priorities and allocating resources has devolved from the respective provincial ministries to regional health authorities.

In most of Canada, responsibility for setting priorities and allocating resources has devolved from the respective provincial ministries to regional health authorities — variously known as "districts" or "boards," depending on the province. In particular, these authorities have a mandate to meet the needs of local populations with limited resources (Lomas, Veenstra, and Woods 1997). In some provinces, resources are allocated to regional health authorities on the basis of a formula that accounts for population, age, sex, and need indicators (Birch et al. 1993; Birch and Chambers 1993). Such allocations imply a resource scarcity constraint at the level of the regional authority. Therefore, some sort of priority-setting tool or framework is required to help decisionmakers allocate resources among the competing claims for the limited resources under the regional health authority's control.

The specific decisionmaking process is, of course, different in each health region. However, a recent survey (Mitton and Donaldson forthcoming) of senior managers in three health regions in Alberta can provide some insight into the current processes at work and some context for the more formalized tools discussed below.

This survey found that, in general, no formal process of setting priorities and allocating resources was identified in any of the three regions, a finding in line with the reports of provincial auditors general referred to above. The respective processes are largely *ad hoc*, and little consideration is given to issues of transparency and explicitness. Allocations are based on historical trends, with some adjustments for demographics or political will. In our sample, the majority of respondents stated that the process of allocating resources across programs does not work well. Key suggestions for improvement from the group included the implementation of a rational, systematic framework for priority setting, and improved communication between administrators and physicians. Interestingly, only 12 of the 62 senior managers interviewed in Alberta had knowledge of specific tools that could be used in the priority-setting process. When told about the framework we present in a later section of this paper, 92 percent of managers stated that it would have the potential to help with health priority setting in their regions.

Other important findings of this survey include the lack of collection and use of evidence in the decisionmaking process, and the fact that ever-present political will often trumps all. These factors are all likely to be barriers to implementing a formal framework. It should be recognized, however, that health policy managers, like all individuals, react to the environments they are in. Changes in incentives and organizational structures might overcome such barriers.

Previous Approaches to Priority Setting: A Critique

The process of priority setting in health services should be open and explicit and, in order to enhance accountability, should involve the public in some manner.

The literature provides arguments for a number of criteria on which a framework for priority setting should be based. For example, limited resources ideally should be used in a manner that produces the maximum benefit (Laupacis et al. 1993). Further, the process of priority setting in health services should be open and explicit (McKneally et al. 1997; Breen 1991; Norheim 1995) and, in order to enhance accountability, should involve the public in some manner (Breen 1991; Bryan et al. 1998). In addition, national or provincial objectives should be incorporated into the decisionmaking process, and the principle of equity should be considered in addition to efficiency (Breen 1991; Wilson and Scott 1995). Finally, evidence from research should play some part in the decisionmaking process (Robinson 1993; Scott, Donaldson, and Scott 1999).

Several mechanisms for priority setting are possible, each of which meets these criteria to a greater or lesser extent. Examples that have been used to varying degrees internationally include needs assessment, economic evaluation, and defining core services. Each of these approaches, which overlap somewhat, is discussed in turn in this section.

Needs Assessment

One approach used by health authorities to aid in the process of setting priorities is needs assessment, which involves defining total need and then setting a minimum standard of care to meet that need (Mooney, Russell, and Weir 1986). "Need" might be defined by the existence of a treatable condition; evaluative techniques could then be used to measure the met and unmet needs of the particular population based on this definition. However, the approach of setting a minimum standard of care (such as the six rounds of testing to screen for colon cancer discussed above) ignores the reality that there may not be enough resources available to meet even this minimum standard. Again, some sort of priority setting is required. Many needs assessments do not consider the resource implications of policy decisions; attempts may be made to change the mix of services provided based on the needs of the population without giving any consideration to the costs (relative to the effectiveness) of services (Mooney et al. 1992) or any knowledge of opportunity costs. This can lead to making inappropriate decisions (Weinstein and Stason 1977; McKneally et al. 1997).

This is not to say that this type of needs assessment is not important; it can be very useful in identifying a population's unmet needs. But it is not useful for priority setting or for promoting the efficient use of resources (Mooney et al. 1992;

Birch and Chambers 1993). Faced with a given set of health needs, it is not possible to know whether more needs can be met within the current funding envelope without information on how resources are currently spent, or on how the current mix of resource use could be changed to improve the level of benefits (Mooney, Russell, and Weir 1986).

Another approach in this category is epidemiological needs assessment, whereby incidence and prevalence data are used to identify the needs of a population, so that more resources can be directed to treating those diseases that are most prevalent. This approach does not, however, help policymakers decide how much should go where. Nor does it give any indication as to the effect certain interventions may have (Mooney et al. 1992). If a particular disease has no known cure, but is ranked at the top of the list in terms of incidence, should it receive funding that could otherwise be spent elsewhere on conditions with known effective treatments? Will intervening with smaller problems provide more benefits per dollar spent on, for example, providing foot care for older people (Bryan, Parkin, and Donaldson 1991)?

Data on epidemiological needs assessment provide no direction for forming an appropriate plan to allocate the available resources among competing claims on them, in order to meet the needs of the population in the most effective and efficient manner (Donaldson and Mooney 1991). Rather, these data simply indicate the extent of different health problems.

Economic Evaluation

Economic evaluation can be used in health care policymaking to identify the costs and benefits of different treatment options.

Economic evaluation can be used in health care policymaking to identify the costs and benefits of different treatment options. Economic evaluation comprises a body of techniques for the measurement and valuation of costs and benefits associated with the potential implementation of changes to the existing paradigm for providing health care. Economic evaluation can help policymakers determine both what should be done and how best to do it.

There are several different forms of economic evaluation; which one is appropriate depends on the nature of the question involved. One form of economic evaluation is cost-effectiveness analysis, which can be used to determine the best way to achieve a particular objective for a given group of patients. For example, if treatment A results in a better health outcome at less cost than treatment B, treatment A is more efficient and, all things being equal, should be chosen (recall cell A1 in the matrix in Figure 2). If a given option results in a better health outcome but at increased cost (cell C1 in Figure 2), it may still have a lower ratio of cost to effectiveness, providing the most health benefits per dollar spent. It should be noted, however, that if a new option incurs greater costs and benefits than the current option, additional resources may need to be allocated to the new option (Birch and Gafni 1993). The questions that then have to be dealt with are, where will the additional resources come from? and what will be the opportunity cost of spending the resources on the new option *vis-à-vis* the next best use of that spending?

Results from economic evaluations are used in many instances to inform policy decisions, but, as with all tools, they rarely provide the answer. When used properly, the primary strengths of these evaluations are that they consider both costs and benefits, and that two or more treatments are directly compared in terms of

incremental (marginal) gains. These factors ensure that changes in costs and benefits are the key outcomes, thereby avoiding many of the problems of more traditional approaches to policy based on needs assessment, as discussed above. A major limitation of economic evaluations, however, is the time and cost involved; it is simply not feasible to perform such a study for every decision that needs to be made (Donaldson and Mooney 1991). In addition, results from individual economic evaluations still need to fit into a broader priority-setting framework that includes consideration of other health system objectives, such as equity.

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QALY League Tables

Another, related, approach to priority setting involves the concept of cost per quality-adjusted life year (QALY). A QALY can be thought of as equivalent to a healthy year in the life of an individual. QALY league tables rank different procedures in terms of their incremental cost per QALY gained, based on results from different economic evaluations. An example is shown in Table 1.

Interventions are placed in order, from top to bottom of the league table, according to their cost per QALY gained. This convention implies that a higher priority should be assigned to those procedures closer to the top of the list, since they produce greater health gains per dollar spent.

Although this approach can provide valuable information, it also has drawbacks and should not be used in isolation.

A more complete discussion of the limitations of this approach can be found in Gerard and Mooney (1993), but several major points should be highlighted here. First, each entry in the league table has a different comparator, so while the relative value of option A over B may appear to be good, if option B is an inefficient treatment, option A will appear to be efficient even if, in an absolute sense, it is also inefficient (but just not as inefficient as B) (Birch and Gafni 1992). Second, a review of the economic evaluation literature shows that the methods and reporting of the studies that were used to create the league tables are inconsistent (Mooney et al. 1992). The tables' priority rankings do not indicate the problems of the individual studies; this method, therefore, contradicts an important stated advantage of economic approaches — namely, explicitness — and can lead to decisionmaking based on poor-quality data. Third, QALYs provide data only on health benefits; they do not cover broader nonhealth outcomes such as the process of care. If they are the only tool used for priority setting, the resulting decisions may not be based on a complete range of health and nonhealth outcomes for a given treatment. Finally, it is not clear how QALY league tables address the issue of equity (ibid.). The political reality of the decisionmaking process is far more complex than that implied by a simple list of services based on cost and some measure of outcome.

The best-known example of using a league-table-style ranking of treatments in an explicit priority-setting exercise is that of Oregon. As has been well documented, however, this initial approach was abandoned for a more pragmatic approach largely involving judgments from parties with vested interests (Blumstein 1997). As a result of this move away from using cost-effectiveness criteria, the plan in Oregon has not produced an efficient system of rationing (Maynard and Bloor 1998).

Table 1: ***League Table of Costs and QALYs for Selected Health Care Interventions, United Kingdom***

Intervention	Cost per QALY
	(1991 UK pounds)
Cholesterol testing and diet therapy only (all adults ages 40–69)	220
Neurosurgical intervention for head injury	240
General practitioner advice to stop smoking	270
Neurosurgical intervention for subarachnoid haemorrhage	490
Anti-hypertensive therapy to prevent stroke (ages 45–64)	940
Pacemaker implantation	1,100
Valve replacement for aortic stenosis	1,140
Hip replacement	1,180
Cholesterol testing and treatment	1,480
Coronary artery bypass graft (left main vessel disease, severe angina)	2,090
Kidney transplantation	4,710
Breast cancer screening	5,780
Heart transplantation	7,840
Cholesterol testing and treatment (incrementally) of all adults ages 25–39	14,150
Home dialysis	17,260
Coronary artery bypass graft (one-vessel disease, moderate angina)	18,830
Continuous ambulatory peritoneal dialysis	19,780
Hospital haemodialysis	21,970
Erythropoietin for anaemia in dialysis patients (assuming a 10% reduction in mortality)	54,380
Neurosurgical intervention for malignant intracranial tumors	107,780
Erythropoietin for anaemia in dialysis patients (no mortality impact)	126,290

Source: Drummond et al. 1997.

Core Services

One further approach to rationing in health care involves attempting to define core services and to fund only those services with public money, an approach that New Zealand and the Netherlands, as well as Oregon, have tried. However, while Oregon used a QALY tool (at least at first) to choose among treatments for its core services list, New Zealand and the Netherlands use criteria-based guidelines. The criteria used are based on attributes such as effectiveness, efficiency, necessity, fair use of public money, and relationship to public values (Feighan 1998). Current practice in Canada is a variation on this theme.

Although such an approach may, in theory, be favored over list-based rankings, in practice all these countries have had difficulty rationing services in this manner. As discussed earlier, a major problem has been deciding which treatments are necessary and are thus a public responsibility, and which treatments should be the responsibility of individual patients and families (Maynard and Bloor 1998). Indeed, empirical evidence from Oregon suggests that the list-based approach to defining a core set of services becomes entirely subjective (Tengs 1996). A further problem identified with the core services approach is that it provides no guidance in determining which treatments are, in fact, cost effective (Wordsworth, Donaldson, and Scott 1996).

The core services approach does not necessarily lead to greater efficiency within those services that receive public funding (National Forum on Health 1997), as it provides no guidance for allocating resources within the group of core services. It also ignores the notion of the margin. For example, a particular service may not be included as a core service because it does not seem to be necessary, yet for some potential consumers it may provide more benefit per dollar spent than the services that are considered to be core. However, shifting some public resources from those services that are "in" to those that are "out" is obviously not possible. Overall, the core services approach has had a limited effect on policy making and choice in jurisdictions where it has been tried (Maynard and Bloor 1998).

More broadly, Caulfield (1996) claims that a definition of core services, or medical necessity, on which to base this approach will never be successfully developed, since there exists no consensus about the values on which such a

definition would inevitably have to be based. Thus, what policymakers need is not a definition of core services, but a framework for decisionmaking that can aid in the priority-setting process (Caulfield 1996).

Program Budgeting and Marginal Analysis: A Proposed Approach to Priority Setting

What is required is a process-based framework, which should include consideration of both marginal benefit and marginal cost.

In our review of approaches for aiding health policy decisionmakers set priorities, several themes can be identified. First, due to the complexity of health care decisionmaking, a single, zero-based approach probably will not work. What is required is a process-based framework, which should include consideration of both marginal benefit and marginal cost. It must be explicit and flexible enough to allow other objectives, including equity, to receive consideration. And it should be pragmatic, in that decisions regarding funding often need to be made quickly and thus limited data may be available to inform those decisions. Each of the approaches discussed above fails to meet one or more of these criteria.

There is, however, a way forward. A framework for setting priorities can be provided through asking three fundamental questions (Mooney, Russell, and Weir 1986). First, given the existing resources, could some redeployment of these resources result in increased total benefit? Second, if additional resources were made available, how could they best be used to obtain the greatest possible benefit? Third, if resources were to be reduced, what cuts could be made to ensure minimum loss of benefit?

It is by looking at potential shifts in resource use that the best pattern of care is reached (Shiell and Hall 1993). Responses to these types of questions can be determined by considering opportunity costs at the margin, allowing decisionmakers to identify the optimal service delivery options within the constraint of limited resources.

This framework, called program budgeting and marginal analysis (PBMA), has been used in the United Kingdom, Australia, and New Zealand (Mooney 1984; Ruta, Donaldson, and Gilray 1996; Peacock, Richards, and Carter 1997). It has the potential to aid in the priority-setting process in Canada and is currently being piloted in health regions in Alberta (Mitton et al. 2000). PBMA is a realistic, output-oriented framework that includes explicit consideration of the marginal costs and benefits of treatment options. Although based on the same principles underlying economic evaluation — such as opportunity costs and marginal analysis, as discussed earlier — this more pragmatic approach can develop a response to resource allocation dilemmas in a timely manner. In essence, PBMA provides a way to operationalize the decision matrix in Figure 2 and to assess potential costs and benefits of a particular action. Its principles are the same as for full-blown project appraisal, where the aim is to "evaluate a project's benefits in terms of what consumers would be willing to pay if those benefits were sold in a market and its costs in terms of benefits that must be forgone due to the diversion of resources to the project" (Richards and Vining 2001, 13). Such measures of benefit can be incorporated into PBMA if enough time and resources are devoted to collecting data and conducting interviews with appropriate patient groups and community members.

Box 1: *The Five Stages of Program Budgeting and Marginal Analysis*

1. What level of resources do we have?
2. How are these resources currently spent?
3. What would we like to do more of, and what would be the impact in terms of extra resources required and benefits to patients or the population?
4. Is there anything we currently do that could be done to the same level of effectiveness, but at less cost, allowing us to free up resources to fund some of the items listed at stage 3? (In other words, can we be more technically efficient?)
5. If we cannot be more technically efficient, are there any areas of care that, despite being effective, should receive fewer resources because a proposal listed at stage 3 is more effective per dollar spent?

Other factors in the priority-setting process — such as equity, political influence, broader policy objectives, carefully screened economic evaluations (including those using the QALY methodology), and the concerns of practitioners or the public — can be incorporated into the decisionmaking process as well (as shown in the example from the Tayside Health Board, discussed below).

The thinking behind PBMA is to assist regional health authority managers — or other health care system managers where regionalization is not in effect — in directing resources so as to maximize the impact of health care on the needs of the local population (Donaldson and Mooney 1991), while taking into account other health system objectives, such as equity (Mooney, Russell, and Weir 1986). Its starting point is an examination of how resources are currently spent before focusing the potential on marginal health gains and costs of changes to that spending, through comparisons across or within programs (Donaldson and Farrar 1993). Since regional health authorities must make choices among competing claims for limited resources (Farrar et al. 2000), this approach should be a useful guide for them in the decisionmaking process (Mooney 1984; Scott, Donaldson, and Scott 1999).

PBMA challenges decisionmakers to answer five questions about resources, presented in Box 1. It can be applied at the level of a regional health authority or a specific program (for example, maternity care, heart disease, child health). At either level, PBMA does not take place in isolation from other managerial activities. It can be carried out concurrently with needs assessment, and it often incorporates published evidence, the views of the public, and the local knowledge of managers and providers. The first two stages of PBMA involve current budgeting. Their underlying premise is highlighted by the question, how can we know where we are going if we do not know where we are? For the other three steps, the focus moves to marginal analysis, which examines the net health gains that can be achieved through changes in the allocation of resources.

One example of PBMA, as represented by the five questions in Box 1, comes from the Tayside Health Board in Scotland (Ruta, Donaldson, and Gilray 1996). The health board decided to examine potential resource reallocations in child health services. A core priority-setting team was then struck to identify margins for change based on a diverse set of inputs, including the literature, local and national policy documents, a program budget, and various regional needs assessments. From this information and a survey of their colleagues, the team developed recommendations for investment and disinvestment that were presented to the health board and subsequently incorporated into the budget planning for the following year. Despite a lack of hard and fast data to support specific changes, the team was able, pragmatically, to assess options for change, making judgments on the marginal costs and benefits of those changes.

This Scottish example shows that, although the priority-setting process has to be recognized as partially political, PBMA clearly provides an evidence base on which decisions within regional health authorities can be made.

The major problem with PBMA is that it is often very difficult to estimate and determine the value of marginal benefits (Mooney, Russell, and Weir 1986). Proponents of this approach would argue, however, that it is not just the precise valuation but the overall way of thinking provided by marginal analysis that is key to making tradeoffs explicit and improving decisionmaking (Mooney et al. 1992; Scott, Donaldson, and Scott 1999). Thus, even when there are information gaps (as in the Tayside example, particularly on the benefit side), this framework provides a specific mechanism through which priority setting and subsequent resource allocation can occur. The key points are the necessity of considering costs — particularly marginal costs — and the recognition that, although judgments about benefits may be required, such judgments should be based not on total benefit but rather on marginal benefit. In addition, it is important that these analyses be provided to decisionmakers in a timely manner and that they incorporate a diverse set of factors in the inherently complex process of setting priorities.

The framework provided by the questions in Box 1 recognizes the basic principles of economic analysis outlined earlier in the paper. Opportunity cost is accounted for by recognizing that the "wish list" produced at stage 3 can be funded only by taking resources from elsewhere (stages 4 and 5). Resources can be obtained from elsewhere by being either more technically efficient (stage 4 or, looking back at Figure 2, cells A1, A2, and B1) or more allocatively efficient (stage 5, or cells C1 and A3 in Figure 2). All of this analysis can be done "at the margin" by considering the amounts of different services provided, rather than whether or not a whole service should be introduced or eliminated.

We challenge health care providers and managers to apply PBMA first within regional health authorities, to get their own houses in order, before asking the provincial ministries of health and, ultimately, taxpayers for more money. This raises the question of what incentives could encourage health care decisionmakers to use such a rational framework. In some jurisdictions, central government bodies have asked health authorities to respond to cost-increasing initiatives with resource-neutral plans, leading to a spate of PBMA activity (Cohen 1995). A more general step would be for independent observers (researchers) to assess comprehensively the barriers and facilitators to its use before suggesting incentives and structures to encourage further uptake.

Conclusion

Health care resources have always been, and will always be, scarce. Consequently, the need to ration their use and set priorities will continue.

Health care resources have always been, and will always be, scarce. Consequently, the need to ration their use and set priorities will continue. The economic approach to priority setting explicitly recognizes this scarcity. It starts with the principles that change should occur at the margin and that the relevant question is how much of a service to provide, rather than which services should be provided at all.

Conventionally, an aging population and technological advancement are thought either to threaten the sustainability of Canada's current medicare system or to require a general increase in health care spending. These arguments are, however,

equivocal; although such factors do lead to increasing pressure on resources, the fact is that funding will always be finite. Spending more on health care should be dependent on the extra benefits to be derived from additional investment. Only where the benefits of increased spending are greater than the opportunity costs should spending be increased, otherwise resources may generate greater benefits overall if invested elsewhere. More spending on health care may not maximize benefits to society.

More data are needed on the changes in costs and benefits of expanding or contracting health care. There is no quick fix to priority setting in health care. Although this challenge may seem daunting, as Andersen and Mooney (1990) argue, decisionmakers have an obligation to measure the changes in costs and benefits of health care. If it is not known whether an increase in expenditure of $X million is better than no increase at all, it is hardly surprising that the government of the day will always choose no increase at all or, at least, not enough to match the demands of all the various interest groups. If policymakers do not take such a course of action to improve the management of resources in the system, Canadians and their governments may demand major reforms to the health care system.

Before further major reform or increased spending can be effective, health care resources have to be better managed.

Before further major reform or increased spending can be effective, health care resources have to be better managed. In our view, improved management is a prerequisite to reform. Given that the key constraint facing Canada's health system is scarcity, a fact that cannot be circumvented, it is paramount that explicit methods be implemented to help decisionmakers set priorities. Past approaches to priority setting either did not adhere to the principles of opportunity cost and marginal analysis or were simply too resource intensive to have practical impact in regional health authorities.

Other countries' experience with program budgeting and marginal analysis, however, means that it may prove to be a suitable economic framework in the Canadian context. It is an approach that recognizes the scarcity of resources and that can help decisionmakers determine the optimal mix of services to provide within current budgets. Once such a framework, within which resources can be managed effectively, is systematically applied, it can be developed further to incorporate more sophisticated measurement tools. Policymakers can then decide if health care spending needs to be increased or if the structure of the Canadian health care system requires more radical changes.

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